CLAIMS:

1. A process for sensing biological or chemical changes in molecular structural shape or mass of molecules attached to the surface of a transverse shear piezoelectric oscillating molecular sensing device driven by a network analyzer, said process comprising:

i) exciting said sensor device at a series of predetermined frequencies ;

ii) collecting data to determine values for the predetermined parameters of series resonance frequency shift (fS), motional resistance (RM), motional inductance (LM), motional capacitance (CM), electrostatic capacitance (Co) and boundary layer slip parameter (α); and

iii) determining relative changes in said measured parameters to detect thereby any changes in molecular structural shape or mass at sensing device surface.

2. The process according to claim 1 further comprising the step of:

iv) correlating said changes with a calibrated set of data for said parameters to determine a value for change in molecular conformation and/or molecular mass.

3. The process according to claim 1 wherein a change in slip parameter (α) and an essentially zero change in series resonant frequency shift confirms a change in molecular structural shape and essentially zero change in mass.

4. The process according to claim 1 wherein said changes in molecular mass or conformation are generated by an interaction between entities bound to the sensor and molecules in the surrounding liquid medium.

5. The process according to claim 4 wherein said entities bound to the sensor are selected from the group consisting of proteins and nucleic acids.

6. The process according to claim 5 wherein said proteins are selected from the group consisting of antibodies, enzymes, molecular receptors, receptor ligands and polypeptides.

7. The process according to claim 5 wherein said nucleic acids are selected from the group consisting of DNA, RNA and oligonucleotides.

8. The process according to claim 4 wherein said molecules in liquid medium are selected from the group consisting of proteins and nucleic acids.

9. The process according to claim 8 wherein said proteins are selected from the group consisting of antibodies, enzymes, molecular receptors, receptor ligands and polypeptides.

10. The process according to claim 8 wherein said nucleic acids are selected from the group consisting of DNA, RNA and oligonucleotides.

11. A method of determining the efficiency of acoustic coupling between a sensor and the surrounding fluid, said method comprising:

a) applying an electrical signal of known frequency and voltage to the sensor;

b) measuring the current through the sensor to determine the impedance at the known frequency;

c) repeating steps a) and b) over a range of frequencies to generate a set of impedance data; and

d) fitting the measured impedance data to determine an α parameter which represents coupling strength.

12. The method according to claim 11, wherein the α parameter is other than 1.

13. The method according to claim 11 wherein the magnitude of said α parameter is dependant on molecular mass and/or molecular conformation at the sensor surface.